WILDLIFE REVIEW

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Washington, D. C. No. 20 May, 1939

Food Habits: Bats

Sherman, H. B. Notes on the food of some Florida bats, Journ. Mammalogy (Wm. B. Davis, College Station, Texas, $1.00 a copy), 20(1), Feb. 1939, pp. 103-104, 1 table.

Notes on the stomach contents of 11 individuals of 4 species.

Food Habits: Birds, miscellaneous

Cottam, Clarence, and Phoebe Knappen. Food of some uncommon North American birds, Auk (Rudyerd Boulton, Field Museum, Chicago, Ill., $1.00 a copy), 56(2), April 1939, pp. 138-169, 6 tables.

Information on 47 uncommon, rare, or extinct species based on 239 stomach analyses and on literature, 44 titles cited. The fullest accounts relate to the emperor goose, European wigeon, masked bob-white, passenger pigeon, large-billed sparrow, and Botteri's sparrow.

Food Habits: Bob-white and pheasant

Bennett, Logan J., and P. F. English. The fall foods of ringneck pheasants and bobwhites, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, 10 cents a copy), 10(1), April 1939, pp. 8-9, 29, 2 photos, 6 tables.

Report on analyses of crop contents of 61 bob-whites and 423 pheasants taken during the hunting season (October-November) in Pennsylvania. Methods are briefly discussed and the sources of the material tabulated by counties. The five most important foods of the pheasant are: Corn, akenes of lesser ragweed, grasshoppers, buckwheat, and seeds of skunk cabbage; and of the bob-white: Akenes of lesser ragweed, corn, wheat, seeds of foxtail grass, and buckwheat. Other items and their frequency of occurrence are listed. 74% of the food of the pheasant and 81% of that of the bob-white consisted of the seeds of crop plants and associated weeds. The best pheasant range in Pennsylvania is in counties where the corn acreage is highest and where the corn is hand-picked and the stalks are left standing over winter. Standing corn adjacent to good brushy cover seems to be necessary for the perpetuation of good bob-white populations. Results are compared with those reported from studies in other States, to 5 of which bibliographic references are given.

Food Habits: Bob-white

Errington, Paul L. Foods of bobwhite in Wisconsin, Auk (Rudyerd Boulton, Field Museum, Chicago, Ill., $1.00 a copy), 56(2), April 1939, pp. 170-173.

Report on 58 stomach contents analyzed by the Biological Survey, arranged to show transition in choice of food through 5 divisions of the season, April-November.

Food Habits: Bob-white

Gray, Anderson M. Winter foods of the bobwhite quail in the Black Belt soil province of Alabama, Alabama Dept. of Conservation (Montgomery), 23 pp., 1 map, 2 tables, Dec. 1938.

The characteristics and plant associations of the Black Belt are described, and the location of the area shown on a map. The quail foods are discussed and tabulated in some detail.

Part of the author's summary is: Data on the winter food habits of the bobwhite quail were procured from the analysis of 440 stomachs collected from the Black Belt soil province of Alabama. The stomachs were obtained between November 20 and February 20 during several years. Vegetable items were found to form 96.89 percent of the food for the season and animal matter the remaining 3.11 percent. Legumes of the pea and senna families (Fabaceae and Cassiaceae) formed the bulk of the vegetable food, 63.34 percent of the total. It was found that 15 kinds of plants contributed one percent or more by volume to the bobwhite diet for the winter season. These plants, in the order of their importance are as follows: Japan clover, beggarweeds, partridge peas, pink wild bean, bush clovers, cowpeas, sesbanias, bull paspalum, oaks, sweet-gum, pines, ragweed, milk peas, pecan, and wild roses.

Food Habits: Deer damage to conifer plantings

Middour, J. C., and James N. Morton. Deer damage study plots in Pennsylvania, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, 10 cents a copy), 9(9), Dec. 1938, pp. 8-9, 30-31, 4 photos.

Reports on plots established in 1929; they were adjoining areas, one with a deer-proof fence, the other unfenced, on State forests in 4 counties, and planted to various conifers. Details are given as to destruction on the unfenced areas and as to comparative height growth and survival on the paired plots. In summary the authors say: "Only the results of the examinations of the experimental plots, made during 1938, have been listed, but these as well as reports made of investigations during previous years, indicate rather clearly that it is almost useless to attempt to establish forest tree plantations in the areas where the plots have been located, provided the deer herd remains as large as it has been since those plots were established in 1929. In many of these areas forest tree planting has been discontinued because it is considered impracticable due to the excessive damage by deer. Not only have most of the planted evergreens been destroyed on the unfenced areas, but the natural growth, likewise has been browsed so heavily that there is very little chance of a satisfactory stand of trees becoming established on these areas unless a reduction is made in the number of deer."

Food Habits: Deer damage to pine

Aldous, Shaler E. Pine in the diet of the white-tailed deer, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 37(3), March 1939, pp. 265-267, 3 photos.

On the Superior National Forest, Minnesota, pine browse formed 7 percent of the food in fall and 14 percent in winter. All of the species of pine present are eaten, jack pine seeming to be preferred. Plantations of that species have been seriously damaged by the deer.

Food Habits: Deer and elk

De Nio, R. M. Stomach analyses of deer and elk in northern Idaho and Montana, University of Idaho (Moscow) Bul. 33(22), Dec. 1938, pp. 34-36, 1 table.

Paper based on the same material as other articles by the author abstracted in WILDLIFE REVIEW, Nos. 15, July 1938, p. 29, and 17, December 1938, pp. 13-14. The present paper tabulates 6 principal classes of foods by frequency and volume of occurrence in deer and elk stomachs and lists the 10 most important species of forage for each of these groups of animals.

Food Habits: Foxes

Platten, Cyril. Hello, Mr. Reynard!, Minnesota Conservationist (Dept. of Conservation, St. Paul, Minn., 15 cents a copy), 65, Jan. 1939, pp. 11, 32, 34, 2 photos.

The distribution of both red and gray foxes has altered in Minnesota in recent years. Apparently establishment of the ring-necked pheasant has facilitated spread of the gray fox. General notes on habits and appearance of the animals, and on the State's experience with bounties. Tabulation by both frequencies of occurrence and volume of the food items from stomachs of 56 gray, and 29 red, foxes. Mice and rabbits make up nearly half of the subsistence of both species, with poultry and game birds together amounting to about 10 to 12 percent.

Food Habits: Grit requirements

McCann, Lester J. Studies of the grit requirements of certain upland game birds, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 3(1), Jan. 1939, pp. 31-41, 3 figs.

Author's abstract: "Experiments with bobwhite quail, Colinus v. virginianus, and ring-necked pheasants, Phasianus colchicus torquatus, on floored pens showed that a continued gritless ration resulted in loss of weight and death, probably due to mineral deficiency associated with lack of fresh grit. When feeding insoluble grit (quartz) it was found that grit consumption increased markedly, but would decrease almost immediately if calcium were added. Glacial gravel fed as grit did not undergo such increased consumption, and if substituted for quartz after an increase had occurred, would give the same effect as calcium. Thus, since grains are known to be calcium-deficient, it appears that granivorous birds depend upon grit for some of this necessary element. Glacial gravel, in some areas at least, is capable of supplying it. These facts gain ecological significance when correlated with the known success of certain exotic, granivorous birds in some glaciated areas or areas having limestone outcroppings, and

their known failure in certain unglaciated areas." Bibliography of 10 titles.

[Lack of calcium cannot be the reason pheasants have not succeeded in regions just south of the zone of satisfactory establishment as the limestone-dominated landscapes of southern Indiana, and of Kentucky and Missouri lie there.]

Food Habits: Grouse, Ruffed

Nelson, A. L., Talbott E. Clarke, and W. W. Bailey. Early winter food of ruffed grouse on the George Washington National Forest, U. S. Dept. of Agriculture Circ. 504 (Supt. of Documents, Washington, D. C., 5 cents a copy), 37 pp., 30 figs., 2 tables, Dec. 1938.

Well illustrated discussion of groups of plants that were the most important sources of foods found in 184 crops and 185 gizzards collected in 1935 and 1936. One table gives the results of stomach analysis on both volumetric and numerical bases and names the parts of the plants eaten; the other indicates shade tolerance of the plants. Twenty species made up about 85 percent of the total food; they grow chiefly in wooded areas with open canopies and with soils sufficiently productive for growth of mixed stands of shrubs and vines. Two-thirds of the illustrations are presented to facilitate field identification of the plants in winter condition.

Food Habits: Hare, Snowshoe, in relation to forests

Cox, W. T. Snowshoe hare useful in thinning forest stands, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 36(11), Nov. 1938, pp. 1107-1109.

Interest in the hare has been aroused by its periodic fluctuations and by the damage it does to forest plantings, but the value of its services in thinning natural reproduction has been largely overlooked. The results of a study of thinning of jack pines by hares in Minnesota, which are tabulated, show reduction to an average survival of 5.8 percent. Unthinned, the seedlings make very little growth; thinned, the survivors recover from their stunted condition and make rapid growth. The author suggests that damage by hares in plantations can be controlled by making light rather than heavy plantings, thus avoiding the creation of dense cover attractive to the animals.

Food Habits: Hawks and owls

Bond, Richard M. Observations on raptorial birds in the lava beds--Tule Lake region of northern California, Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 41(2), March-April 1939, pp. 54-61, 1 fig., 3 tables.

The population of hawks in a given locality reduced 75 percent from 1936 to 1937 due in part to lessened abundance of rodents and possibly also to botulism. A tabulation records prey identified at the nests or by observation for 8 species of hawks. Lists are given of the food items determined from nearly 1,800 pellets of owls, representing, unfortunately, 2 species (mixed). As to bird prey the author says, "it is quite clear that none of the species is endangered, or

probably appreciably reduced in numbers, by either the hawks or owls." Calculation of the number of meadow mice needed to feed the predatory bird population gives an average of 12 per acre. The figures may be 50 percent in error and no definite conclusions are drawn.

Food Habits: Kingfisher

White, H. C. The feeding of kingfishers: Food of nestlings and effect of water height, Journ. Fish. Res. Bd. Canada (Toronto, Canada), 4(1), 1938, pp. 48-52, 2 figs., 1 table.

Author's abstract: "Nestlings on the Margaree river, Nova Scotia, are fed young salmon and trout only, whose average size increases with that of the bird, indicating selection by the parents. The proportions of trout (Salvelinus fontinalis) to young salmon (Salmo salar) in the food of the adults varies directly with the height of the water."

Food Habits: Legumes, utilization of by wildlife

Graham, Edward H. Legumes for erosion control and wildlife, Soil Conservation (Supt. of Documents, Washington, D. C., 10 cents a copy), 4(9), March 1939, pp. 210-211, 2 tables.

There are about 2,000 species of legumes native to the United States and 50 in cultivation that are of commercial importance. Plants of this group are a valuable source of food for wildlife. Available information from the literature and from Biological Survey files is tabulated to show the number of birds and mammals known to feed on various genera and species of legumes, and the kinds of wildlife that use legumes most. Clovers head the generic list and alfalfa the specific; the bob-white is far in the lead of consumers, being known to feed upon 88 species. The data are also discussed in the text and the extensive use and importance of legumes in erosion control pointed out.

Food Habits: Lizards

Knowlton, George F. Lizards in insect control, Ohio Journ. Science (Dr. Bernard S. Meyer, Ohio State University, Columbus, 50 cents a copy), 38(5), Sept. 1938, pp. 235-238.

Records of food identified from the stomachs of 9 kinds of lizards in Utah. There is often a perceptible limitation of agricultural pests in areas where lizards are abundant. Populations of from 50-400 Uta s. stansburiana per acre are not unusual in favorable breeding and feeding locations. [In such localities the effects of lizard feeding would far exceed those of birds.]

Food Habits: Merganser, American

Salyer, J. Clark, II, and Karl F. Lagler. The merganser--trout fancier, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 28(1), Jan.-Feb. 1939, pp. 33-36, 1 photo, 1 drawing.

In most streams the American merganser feeds chiefly on the rough fish there preponderating but on typical trout streams it also feeds largely on the most available prey, which is trout. This paper reports on analyses of the stomach contents of 157 birds of this species from Michigan trout streams. The average number of trout per stomach was about 2.5; the daily consumption is estimated at 5; probably 1.5 lbs. of food are eaten daily; rather large sized prey seems to be sought. In streams where there are great populations of small sunfishes, the mergansers may be beneficial in reducing their numbers and thus to some degree overcoming stunting. Where control seems to be required, the form recommended is driving the mergansers to lower open waters in which the proportion of trout among all fishes is low. Repeated drives tend to keep the birds on such waters. The mergansers can do great damage at rearing ponds and should be excluded by wiring.

Food Habits: Merganser, Red-breasted

Munro, J. A., and W. A. Clemens. The food and feeding habits of the red-breasted merganser in British Columbia, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 3(1), Jan. 1939, pp. 46-53, 1 map.

Authors' abstract: "The red-breasted merganser is an abundant visitant to the coast regions of British Columbia from September to April inclusive. Thus the relation of the species to the fisheries is seasonal and centers chiefly about its feeding habits on the coast waters. The food of ninety-six specimens taken on the lower stretches of coastal streams consisted largely of salmon eggs and sculpins while that of fiftoen specimens taken on the sea comprised chiefly herring with a smaller percentage of salmonoids, eulachons, sticklebacks, sculpins, blennies, rockfishes, and crustaceans." Bibliography of 9 titles.

Food Habits: Nutritional value of pinon nuts

Little, Elbert L., Jr. Food analyses of pinon nuts, Southwestern Forest and Range Expt. Sta. (Tucson, Ariz.) Noto 48, 2 pp. (mimeographed), Dec. 1938.

Analyses of nut meats of Pinus edulis, P. monophylla, and P. sp. (imported), with references to their sources, and general notes on food value of pinon nuts and pignolias.

Food Habits: Owl, Barn

Wooster, L. D. The contents of owl pellets as indicators of habitat preferences of small mammals, Kansas Acad. Sci. Trans. (Topeka, Kans), 39, 1936, pp. 395-397, 2 tables.

A study of the foods used by 4 barn owl families, the nests of which were so located that hunting by the parents was mainly in different ecological associations. Though not the author's chief interest in the findings, the well-known influence of availability upon food utilization is emphasized anew. Mammals of 17 genera were identified, Microtus, Peromyscus, and Perognathus in largest numbers.

Food Habits: Owl, Great horned

Langenbach, John R., and Robert D. McDowell, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, 10 cents a copy), 9(10), Jan. 1939, pp. 6-9, 3 figs., 7 tables.

Tables show the cause of death of the specimens reported upon, in part distributed according to sexes, years, and months. Extreme and average weights and measurements are given for a large number of the owls. Methods used in the food study are briefly discussed and the results presented in both text and tables. Economic classification of prey assigns 66.2 percent as beneficial to man, 18.2 percent harmful, and 15.6 percent neutral. The policy of no protection is approved and that of bounty payment recommended for continuance to facilitate further study of the food.

Food Habits: Owl, Short-eared

Hendrickson, George O., and Charles Swan. Winter notes on the short-eared owl, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.50 a copy), 19(4), Oct. 1938, pp. 584-588, 2 figs., 2 tables.

Near Ames, Iowa, a wintering group of short-eared owls (18 the maximum observed) fed almost exclusively upon mice from January 14 to March 13, 1937. They consumed some 90 mice daily, or about 5,880 for the period. Snow protected Microtus and caused the owls to take more Peromyscus. The results are compared with those of other recent studies by Errington and Tomkins.

Food Habits: Partridge, European

Ford, John, Helen Chitty, and A. D. Middleton. The food of partridge chicks (Perdix perdix) in Great Britain, Journ. Animal Ecology (Cambridge University Press, 200 Euston Road, London, N. W. 1, England, 20 shillings a copy), 7(2), Nov. 1938, pp. 251-265, 2 figs., 10 tables.

Authors' summary: "The contents of sixty-nine partridge chick crops were analysed, mostly from grass, clover and lucerne habitats. During the first 2 weeks after hatching the food is predominantly animal, during the third week a change occurs and from 3 weeks onward, food is almost entirely vegetable. Feeding on insects is probably random, the most important forms eaten being larvae of clover weevils, larvae of Lepidoptera, the springtail, Sminthurus viridis, Aphididae and ants. In evaluating the various constituents of the crops as to their importance as food, it was found necessary to consider not only the number of each species eaten, but also the volume and frequency of occurrence."

The figures graphically portray the change in proportions of animal and plant food and in weight of the chicks with age, information that is presented also in numbers in the tables. All food items identified are listed together with their frequencies by age groups of the chicks in addition to total numbers of occurrences. The food items are tabulated by groups also for each crop analyzed, again by age classes of the chicks.

Food Habits: Raccoon

Giles, LeRoy W. Fall food habits of the raccoon in central Iowa, Journ. Mammalogy (Wm. B. Davis, College Station, Texas, $1.00 a copy), 20(1), Feb. 1939, pp. 68-70, 1 table.

Analysis of 67 scats; corn, crayfish, and wild fruits the leading items.

Food Habits: Snail (Polygyra)

Wolf, Fred T., and Frederick A. Wolf. The snail Polygyra thyroidus as a mycophagist, Bul. Torrey Botanical Club (New York Botanical Garden, Bronx Park, New York, N. Y., 75 cents a copy), 66(1), Jan. 1939, pp. 1-5, 1 pl.

Fungi are an important source of food for mollusks, especially of slugs, accounts of which are reviewed. Less has been published on snails but 2 papers are abstracted. The authors' observations on the species mentioned are detailed; most of them were made in a laboratory. Bibliography of 11 titles.

Food Habits: Squirrel, Red

Clarke, C. H. D. Some notes on hoarding and territorial behaviour of the red squirrel, Sciurus hudsonicus (Erxleben), Canadian Field-Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 53(3), March 1939, pp. 42-43.

Cones of Pinus resinosa are gathered and scattered, scarcely concealed, in needle litter in the individual's territory. A squirrel may pick as many as a thousand cones in a day, but gets them from different sources and does not strip a single tree. It is doubtful whether one cone in a hundred is ever recovered by the squirrel, but the seeds from the cached cones do not germinate since the moist green cones heat and kill the seeds.

Food Habits: Squirrel damage to spruce

Anon. Squirrels vs. black spruce, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), Winter 1939, pp. 15-16, 1 photo.

Cutting off twigs from 1-5 feet below tip so that the crown is of smaller diameter there.

Food Habits: Utilization of fruits of woody plants

Deck, Raymond S. Planting for wildlife, Country Life and the Sportsman (251 Fourth Ave., New York, N. Y., 50 cents a copy), 74(6), Oct. 1938, pp. 52-53, 107-109, 7 photos.

Personal observations on utilization of fruits of native and introduced woody plants in New England. Also brief notes on seed producers.

Food Habits: Water birds

Simpson, Thomas W. The feeding habits of the coot, Florida gallinule, and least bittern on Reelfoot Lake, Reelfoot Lake Biol. Sta. Report (Tennessee Academy of Science, Nashville, Tenn.) III, Jan. 1939, pp. 110-115, 1 table.

Description of the habitat, report on field observations, and notes from the literature of which 17 titles are cited. The results of stomach analyses are tabulated and summarized in the following paragraphs:

"1. The food of the American Coot consists of approximately 45 per cent coontail 'moss', 35 per cent duckweeds, 18 per cent yellow water-lily seeds, and 2 per cent animal matter.

"2. The food of the Florida Gallinule consists of 35 per cent coontail, 40 per cent duckweeds (mostly Wolffia), 20 per cent seeds of cutgrass and yellow water-lily, and 5 per cent animal matter.

"3. The food of the Least Bittern consists totally of aquatic animals, including 75 per cent fish, 10 per cent small frogs, 10 per cent aquatic insects (dragon-flies, water bugs, and others), and 5 per cent or less of small mammals.

"4. Observation of the Reelfoot Lake marsh birds seems to indicate that in this group availability plays a more important role than preference in food selection."

Life Histories: Bear, Black

Schoonmaker, W. J. Notes on the black bear in New York State, Journ. Mammalogy (Wm. B. Davis, College Station, Texas, $1.00 a copy), 19(4), Nov. 1938, pp. 501-502.

Chiefly on hibernation, and on number and growth of young.

Life Histories: Beaver

Ruedemann, Rudolf, and W. J. Schoonmaker. Beaver-dams as geologic agents, Science (Lancaster, Pa., 15 cents a copy), 88(2292), Dec. 2, 1938, pp. 523-525.

Beaver dams up to 2,140 feet long and impounding 1,241 acre-feet of water are on record. Forty-six dams have been observed on 5-3/4 miles of a stream in Colorado. Beaver meadows may be formed in as few as 15 years. From their investigations, the authors conclude "that beavers are able to aggrade all smaller valleys below the size of navigable rivers and having been active for many thousands of years have accomplished an enormous amount of aggrading work and are important physiographic agents. Their work is characterized by complete aggrading of valley floors, originally in small descending steps, which disappear in time and leave a gently graded, even valley plain horizontal from bank to bank. The fine silt gathered in the beaver pools has produced the rich farm land in the valleys of the wooded areas of the northern half of North America."

[There is food for thought here as to the fate of stream impoundments.]

Life Histories: Beaver

Trump, George E. The beaver. Pennsylvania's most interesting fur-bearer, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, 10 cents a copy), 9(12), March 1939, pp. 4-5, 5 figs.

A popular account of the beaver and its activities and beaver trapping, illustrated by 5 drawings, by Earl L. Poole, of more value than the article itself.

Life Histories: Bighorn and mountain goat

Goddon, F. W., and L. T. Gutzman. Bighorn sheep and mountain goat, University of Idaho (Moscow) Bul. 33(22), Dec. 1938, pp. 43-49, 1 table.

Estimates of the population and kill by hunters and predators on the Salmon National Forest from 1917-1937, inclusive. Discussion of habits and decimating factors leading in each instance to the conclusion that more information is badly needed. Known facts are compared with the findings of Mills in Yellowstone National Park. Specific recommendations for research are made.

Life Histories: Deer, White-tailed

Schoonmaker, W. J. Notes on the whitetail deer in New York State, Journ. Mammalogy (Wm. B. Davis, College Station, Texas, $1.00 a copy), 19(4), Nov. 1938, pp. 503-504.

Interesting local notes (Columbia County, N. Y.) on home range (normally no greater than one-half mile square); sex relations (monogamous); and kill (one or two deer to each square mile).

Life Histories: Eider, American, eggs

Lewis, Harrison F. Size of sets of eggs of the American eider, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 3(1), Jan. 1939, pp. 70-73, 2 tables.

Author's abstract: "Record of 1,131 sets of Somateria mollissima dresseri observed on north shore of Gulf of St. Lawrence in 1934-1938. One to ten eggs each, average 4.04. Annual averages range from 3.89 (1936) to 4.25 (1938). Sizes of sets in descending order of frequency are four, five, three, two, six, one, seven and eight, ten. Average number of eggs before mid-June, 3.97; after mid-June, 4.08."

Life Histories: Game birds of Idaho

Murray, T. B. Upland game birds in Idaho and their future, University of Idaho (Moscow) Bul. 33(22), Dec. 1938, pp. 55-60, 8 maps.

Discusses the original distribution and abundance and the decline of 7 native species, and the varying success attained in establishing 3 introduced game birds. The Idaho ranges of all of those are mapped. The fate of the various species is linked with land utilization and research is needed to make the best of the situation.

Life Histories: Goose, Greater snow, migration

Dery, A. Migration automnale de la grande oie blanche, Provancher Soc. Nat. Hist. Canada (Quebec) Ann. Report 1938, pp. 120-133, 1 photo, 2 maps.

Autumn movements from Cap Tourmente, Quebec, to New Inlet, N. C., with quotations from J. Richardson and Charles K. Nichols as to the spring migration.

Life Histories: Gopher, Pocket

Gabrielson, Ira N. Thomomys the engineer, American Forests (919 Seventeenth St., N. W., Washington, D. C., 35 cents a copy), 44(10), Oct. 1938, pp. 453-454, 478-479, 3 illus.

Equipment of the pocket gopher for tunneling. Damage done to gardens, alfalfa fields, and orchards and to mountain meadows through accelerating erosion; possibilities of control. Notes on food habits and life history.

Life Histories: Ground squirrel, Thirteen-striped

Criddle, Stuart. The thirteen-striped ground squirrel in Manitoba, Canadian Field-Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 53(1), Jan. 1939, pp. 1-6, 2 tables.

Summary of observations of the writer since 1882. Distribution is discussed and description, measurements, and weights given. Under general habits are notes on sounds made, period of activity, drinking, climbing, swimming, fighting, and dusting. Parasites are briefly mentioned, and the sex ratio, breeding habits, young, burrows, nests, hibernation, food, economic status, and control also are treated.

Life Histories: Grouse, Blue

Murray, T. B. Blue grouse, University of Idaho (Moscow) Bul. 33(22), Dec. 1938, pp. 63-65.

Notes on subspecies in Idaho, their distribution, habits, food, nesting, and seasonal movements. The species is the best and most sought native upland game bird and should be the object of good management. The chief methods by which the birds can be restored and maintained, "are: first, to protect the native vegetation, upon which they depend for both food and [cover] x x x second, to regulate hunting, particularly in accessible areas, so that breeding stock is not threatened; and third, to keep predation down to a point where it is not serious. These measures are vitally important on the critical spring and early summer feeding ranges."

Life Histories: Kite, Mississippi

Sutton, George M. The Mississippi kite in spring, Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 41(2), March-April 1939, pp. 41-53, figs. 17-24.

This bird, which many ornithologists have never seen, is common in western Oklahoma, but subject to decimating influences of which the commercial egg collector is most threatening. The paper describes kite habitat, and gives notes on migration, behavior and physical conditions of the birds in spring, nest-building, nest and nest site, oviposition and incubation, eggs, young, food, and parasites. The food in May and June according to 16 stomach analyses made in the Biological Survey is almost exclusively insects, largely Orthoptera and Coleoptera.

Life Histories: Mammals, breath holding

Irving, Laurence. Respiration in diving mammals, Physiological Reviews (19 Chase St., Baltimore, Md., $2.50 a copy), 19(1), Jan. 1939, pp. 112-134, 4 tables.

Publication not abstracted but merely called to attention. It is a physiological and anatomical review of a complex subject, accompanied by an extensive bibliography. It includes tables citing duration of dives in 17 species of mammals, endurance of forced submersion of 6 species, and oxygen capacity of the blood in 9 groups.

Life Histories: Marten

Brassard, J. A., and Richard Bernard. Observations on breeding and development of marten, Martes a. americana (Kerr), Canadian Field-Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 53(2), Feb. 1939, pp. 15-21, 1 pl., 4 figs., 3 tables.

Notes on animals in the Quebec Zoological Gardens indicating annual production of from 1-3 young and gestation period of 220-230 days. Growth in weight and dimensions of the young are tabulated and those in weight expressed in graphs for 4 individuals. There are remarks upon the development of various characters, including the fur and the teeth. Bibliography of 6 titles.

Life Histories: Muskrat

Errington, Paul L. Reactions of muskrat populations to drought, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.50 a copy), 20(2), April 1939, pp. 168-185.

Consideration of adaptations of the muskrat for existence, attachment of the animals for home range, territories and movements, intraspecific strife, predators, foods and feeding routines, digging and building, and drought mortality. Author's summary: "Recent drought seasons have provided exceptional opportunities for the study of muskrat populations living under emergency conditions. Although the animals may show considerable tolerance to habitat changes and may modify their living routines accordingly, their behavior remains basically rather stereotyped. A large proportion of the muskrats resident in drying out habitats tend to stay in familiar home ranges, and, while they may suffer heavy or even annihilative mortality, they are usually more fortunate than the animals that attempt to go elsewhere. As vicissitudes become intensified, there is a conspicuous increase of intraspecific strife, vulnerability to predation

(notably by mink), random and often lethal wandering, and, in winter, losses from hunger and cold." Bibliography of 10 titles.

Life Histories: Napaeozapus

Sheldon, Carolyn. Vermont jumping mice of the genus Napaeozapus, Journ. Mammalogy (Wm. B. Davis, College Station, Texas, $1.00 a copy), 19(4), Nov. 1938, pp. 444-453, 2 pls.

Notes on live-trapping and the results of the study as to habitat preferences, home range, abundance, general habits, parasites, food, nests, breeding, development of young, and hibernation.

Life Histories: Otter, Sea

Fisher, Edna M. Habits of the southern sea otter, Journ. Mammalogy (Wm. B. Davis, College Station, Texas, $1.00 a copy), 20(1), Feb. 1939, pp. 21-36, 27 figs.

Observations illustrated by line sketches of a group of 60-80 animals off the coast of Monterey County, California. The notes pertain to resting, feeding, mating, swimming, sleeping, guarding, and vocalizing.

Life Histories: Pheasant, Ring-necked

Green, Wm. E. The food and cover relationship in the winter survival of the ring-necked pheasant, Phasianus torquatus Gmelin, in northern Iowa, Iowa State College (Ames) Journ. Sci., 12(3), April 1938, pp., 285-314, 9 pls., 2 tables.

Report on a study during the most severe winter (1935-36) recorded for Iowa. A considerable variety of cover was used and the author suggests that at times even bare ground has refuge value. Herbaceous cover lost its value through being filled with drifted snow. Evergreens were not observed to be used. Escape cover did not seem to be needed as at no time were pheasants noticed to be disturbed by a predator. The birds seemed to have forewarning as they began to congregate in cover several hours before a snowfall. Foods in the order of their importance included field corn, sweet corn, oats, and pigeon grass and other weed seeds; the feeding habits are described. Winter losses are discussed and tabulated; in all they amounted to 48.2 percent of the early winter population. They are attributed to 7 causes of which the most important was direct killing by the severe winter weather. Survival was highest in flocks that roosted in dense cover adjacent to a satisfactory food supply.

Life Histories: Pheasant nesting, Ohio

Leedy, Daniel L. Pheasant nesting study, Wood County, Ohio--1937, Ohio Wildlife Research Station (Ohio State University, Columbus) Release 82, 9 pp., 1 fig., 2 maps, 3 tables, mimeographed, Feb. 1938.

"During the 1937 mowing season 197 meadows (about 10 per township) were checked in Wood County. These totaled 2,566 acres and 914 pheasant nests were reported, or an average of one nest per 2.8 acres of hay mowed. For each 100

nests, 9.9 hen pheasants were killed and 20.8 hens were crippled. Thus the percentage of hens killed or crippled was 30.7%.

"On this basis the 41,820 acres of hay in Wood County (Soil Conservation Service figures for 1935), contained 15,512 nests and the mowing season resulted in the death of 1,536 hen pheasants and the crippling of 3,226 others. Probably most of the crippled pheasants are killed by predators or die because only three of the 1,610 hens trapped on refuges in 1936-37 were believed to have been crippled by mowing machines."

The relative density of nesting in various types of cover is described and graphed; and the distribution of nests with respect to distance from an edge is stated in 3 categories; the nests are very evenly distributed. Data are recorded on various phases of nesting, decrease in broods after hatching, and sex ratio of young birds. There is a summary of 16 paragraphs.

Life Histories: Quail, Valley

Glading, Ben. Studies on the nesting cycle of the California valley quail in 1937, California Fish and Game (Ferry Bldg., San Francisco, Calif.), 24(4), Oct. 1938, pp. 318-340, figs. 101-111, 2 tables.

Author's summary: "The nesting cycle of the valley quail in the foothills of the Sierra Nevada is considered to be an important phase of the game management problem of this species in California. In a study on the San Joaquin Experimental Range of the U. S. Forest Service in Madera County, California, during 1937, a total of 96 nests of valley quail was found. Courtship and nesting behavior are outlined. The maximum number of nests was found in the month of May. The average clutch size in 40 incubated nests was 10.97 eggs. The average brood size in 16 hatched nests was 10.18 young. A wide range was exhibited as to choice of nesting cover, with dry grass being used most commonly, both as cover and as lining for the nests. Methods of identifying the work of nest predators are given. Seventeen of the 96 nests were successful. Ground squirrels are inferred to have robbed 30 of the 96 nests. An increase of quail has followed reduction of ground squirrels by poison on a 300-acre area for two years." There is a bibliography of 9 titles.

Life Histories: Rat, Wood

Lay, Daniel W., and Rollin H. Baker. Notes on the home range and ecology of the Attwater wood rat, Journ. Mammalogy (Wm. B. Davis, College Station, Texas, $1.00 a copy), 19(4), Nov. 1938, pp. 418-423.

The home range is small, about 80 feet in diameter in the most definitely ascertained instance. Homing occurred from distances up to 1,360 feet in woodland, but failed when the animals were released in grassland. There are observations on population density, habitat relationships, dens, food, fighting, animal associates, and ectoparasites. The food included fruit and leaves of water oak, hackberry, and yaupon, and leaves of several other plants (named).

Life Histories: Sex ratio of birds

Mayr, Ernst. The sex ratio in wild birds, American Naturalist (Science Press, Lancaster, Pa., $1.00 a copy), 73(745), March-April 1939, pp. 156-179.

Summary and discussion of available information. Author's abstract: "(1) The principal purpose of this paper is to show that in birds a great deal of well-documented evidence exists proving the occurrence of strongly uneven sex ratios; (2) the sex ratio may be high or low, favoring the male or the female sex; (3) the evidence points to the existence of this unbalanced condition already in the primary sex ratio, although physiological and environmental factors may modify it during prenatal and postnatal life; (4) in nearly all well-studied cases unequal sex ratios have been found to be correlated with peculiarities in the life history of the birds; (5) the study of the cytology and genetics of sex determination in birds is a promising and practically untouched field."

Life Histories: Squirrels

Kelway, Phyllis. The grey squirrel, Game and Gun and the Angler's Monthly (34 Victoria St., London, S. W. 1, England, 1 shilling a copy), 16(162), March 1939, pp. 159-162, 4 photos.

Comparison (fairer than usual) with the native red squirrel. The gray species has a wider range of food and is more voracious; both species eat birds' eggs. There is no serious conflict between them. Miscellaneous notes on their life histories are included.

Life Histories: Thrush, Wood

Weaver, Florence G. Studies in the life history of the wood thrush, Bird-Banding (Charles B. Floyd, 210 South St., Boston, Mass., 75 cents a copy), 10(1), Jan. 1939, pp. 16-23, 1 fig.

Two years study at Ithaca, N. Y., reported under the headings of Territory, Song, Courtship and mating, Nest, Social parasitism, Number of eggs laid and survival of the young (43.13 percent), and Second brood.

Life Histories: Woodchuck

Twichell, A. R. Notes on the southern woodchuck in Missouri, Journ. Mammalogy (Wm. B. Davis, College Station, Texas, $1.00 a copy), 20(1), Feb. 1939, pp. 71-74.

Dens, non-colonial habits, population density, cruising radius, food (in captivity), time of activity, watchfulness, hibernation, breeding season, and parasites in central Missouri.

Life Histories: Woodpecker, California

Ritter, Wm. E. The California woodpecker and I, University of California Press (Berkeley, Calif., $3.50 a copy), 340 pp., illus., 1938.

Titles of the life history chapters are: The species--its relatives, and its place on the earth; Foods--storing-- solution of the food problem; Reproduction and domesticity; problems of settlements and journeyings; and The defense of home and food sources. Most of the book is rambling philosophy which the author terms "A study in comparative zoology, in which are set forth numerous facts and reflections by one of us about both of us." There are 4 pages of bibliography and a comprehensive index.

Management

Cahalane, Victor H. Integration of wildlife management with forestry in the Central States, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 37(2), Feb. 1939, pp. 162-167.

Favorable and unfavorable effects of wildlife on forests are discussed and the correlation of forest management and wildlife management treated under the heads of forest protection, grazing, and silviculture. Author's conclusion: "If wildlife resources are given adequate consideration, managers of public forest lands will not be forced to overemphasize wildlife practices as a result of pressure from recreationists, and private landowners will have an opportunity to cash in on cooperation with the sportsmen. With knowledge gained from research on the interrelationships and needs of plants and animals, wildlife management can be integrated with sound forest management in all regions of the country, and especially in the well-settled Central States." Bibliography of 16 titles. Brief discussion by 5 individuals is reproduced following the article.

Management: Attracting barn owls

A., R. Helping the useful barn owl, Game and Gun and the Angler's Monthly (34 Victoria St., London, S. W. 1, England, 1 shilling a copy), 16(162), March 1939, pp. 147-150, 4 photos.

By providing nesting accommodations in the form of boxes or barrels (preferably the latter) securely fastened in suitable trees. Bedding as sawdust or peat-moss should be supplied. Barn owls accept such quarters and return to them year after year. There are notes on competitors and their control. More than in the case of any other British owl, rats seem to constitute the principal item in the barn owl's diet. The value of the services that they render to keepers and farmers would indeed be hard to compute.

Management: Beaver

Smith, Laurence H. Beaver and its possibilities in water regulation, University of Idaho (Moscow) Bul. 33(22), Dec. 1938, pp. 85-88.

Primitive abundance of beavers and their decimation by trapping. The value of dam construction by a colony of beavers may be a hundred dollars and the dams, furthermore, are kept in repair. Estimates of beaver values on the

Ochoco National Forest in water conservation and associated forage production are impressive enough to justify any reasonable program of transplanting and management. The most successful plantings were made among aspen-poplar growth, and following those, in aspen-willow, and lodgepole-willow-aspen. Beaver transplanting is an economical offset to practices destructive to watersheds. It should be based on studies of beaver requirements and of the available food resources, and calls for rigid protection of the new colonies.

Management: Big game

Hatch, A. B. Big game management, University of Idaho (Moscow) Bul. 33(22), Dec. 1938, pp. 49-54.

Public interest in hoofed game, the applicability of knowledge of livestock to these animals, and the distressing phenomena of overpopulations point to the feasibility and need of big game management. The large ruminants have been forced out of their original plains and foothill range into unnatural environment at higher elevations, where, it is not surprising, difficulties arise. "The primary objective of big game management today is to maintain an optimum number of removable animals on all lands on which the raising of wildlife crops does not seriously interfere with agriculture, with the livestock industry, or with forestry." Methods of managing big game are discussed under four headings: (1) Artificial restocking, (2) predator control, (3), restriction of hunting, and (4) creation of game refuges. Changes in present practices must be gradual and should be guided by research.

Management: Bobwhite

Lehmann, Valgene W. Fenced areas for bobwhites, Texas Game, Fish, and Oyster Commission (Austin), Bul. 12, 2 pp., 1 pl., June 1938.

"Properly planted half-acre plots, fenced to exclude livestock and spaced about 250 yards apart, offer landowners one of the most effective and inexpensive means of improving habitat conditions for Bobwhite Quail. The plots provide protected 'islands' in which Quail can find plenty of food and x x x cover in which to build their nests and raise their young. There are many Quail ranges in Texas that produce few Quail because they are overgrazed by cattle, sheep and goats, or cultivated so intensely that little food or cover is left for birds. The half-acre fenced plots, square or rectangular in shape, are recommended to remedy this situation." Directions are given for laying out and planting fenced areas for two kinds of situations, namely where woody cover is already present, and where it is absent. Quail are quick to find and use these half-acre shelters.

Management: Burning

Heyward, Frank. The relation of fire to stand composition of longleaf pine forests, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.50 a copy), 20(2), April 1939, pp. 287-304, 7 figs., 6 tables.

This article is drawn to the attention of readers of WILDLIFE REVIEW who wish to keep informed as to debate in this controversial field. The author

refers to the relation of woodland management, particularly burning, to wildlife, basing his remarks in that respect upon Stoddard's publications. He shows that exclusion of fire results in the increase of hardwoods in a longleaf pine forest and states that "it seems evident that pines will ultimately be completely excluded from the forest by hardwoods." [Comment. It is thus further evident that burning, a game management practice in longleaf pine forests, is necessary to perpetuation of those forests, the most valuable known for their region.] The article includes a bibliography of 12 titles.

Management: Burning

Stoddard, Herbert L. The use of controlled fire in southeastern game management, Cooperative Quail Study Association (Thomasville, Ga.), 21 pp., Jan. 1939.

Supersedes a 1935 report on the same subject (abstracted in WILDLIFE REVIEW, No. 1, September 1935, p. 13) but has been entirely rewritten. Quail land in the Southeast, varying from 10 to 75 percent cultivated, may produce satisfactorily provided the uncultivated part is maintained in proper condition for the birds. That involves chiefly cover control for which fire is the most economical agent. It has long been used, and despite propaganda against woods burning, it is not generally destructive as claimed, has known positive values and, properly used, is definitely recommended. The author says, "Due to the accumulation of evidence we believe that burning at the right time, in the right amount, with the proper frequency, and in a way to accomplish the desired results with the least damage to other interests, is the most important single operation involved in quail management in the region. We differentiate sharply between controlled burning and uncontrolled burning. If a choice had to be made, however, between late winter burning of the kind long carried on by natives of the region (who know more about fire use than they are usually given credit for) and the total fire exclusion policy so strongly advocated by some, the former would be vastly preferable so far as wildlife interests are concerned."

Fire exclusion damages lands for quail production and builds up fire hazards in the form of dense ground cover and litter. "Then all too frequently, during a period of summer drought and high wind the inevitable happens--the woods catch fire accidentally (from lightning, a cigarette butt or other cause)--and the result (owing to the accumulation of highly combustible ground cover) is denuded land and a fire-damaged forest, destitute for a time of valuable wildlife and scenically an eye-sore. Fire-damaged areas, resulting from mistaken attempts at fire exclusion without adequate safeguards, are becoming all too numerous over the deep Southeast. Properly controlled burning at intervals of from one to three years is the best known insurance against destructive conflagrations in pine forests."

Controlled burning is discussed as to the proper season, frequency of use, proportion of land to burn, block and spot systems, night and day application, and tools for control.

A game production program in the Southeast fits in well with a type of forestry that has as its objective selective cutting of the largest trees or clean cutting of small acreages. The longleaf pine, of leading value, is

especially fire resistant and controlled burning may be effectively used in establishing and maintaining stands of this species. Other pines should be given complete protection from fire during the seedling and early sapling stages. Then too dense ground cover under them can be thinned by light late winter night burning. Upland hammock of mostly deciduous trees should not be burned.

There is special discussion of burning in relation to wild turkey production, of fire as a means of cotton rat control, of burning to maintain the floral beauty of pinelands, and in relation to ticks, chiggers, and disease.

Management: Correlation of pest control and soil conservation practices

Harris, Kenton L. Soil conservation versus insect control, Proc. Entomological Society of Washington (U. S. National Museum, Washington, D.C., 50 cents a copy), 41(1), Jan. 1939, pp. 20-26.

Quotations from authorities on the subjects noted in title. The recommendations, to some extent opposed, are discussed and tabulated. In general, insect pest control policies call for elimination of ground cover--the fundamental resource for soil conservation. For the two agencies concerned to meet on common ground will probably depend upon advances from the entomologist's side. Bibliography of 31 titles.

Management: Deer, White-tailed

Swift, Ernest. The problem of managing deer, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison), 4(2), Feb. 1939, pp. 8-27, 6 figs., 2 tables.

Mostly discussion of differences of opinion about the deer population and its management but includes some data and maps of general interest. The maps show distribution of the deer in winter and summer. A graph and a table record the number of deer tags issued and the estimated kill from 1917 to 1937. Increase in the bag, and in damage by deer as well as observation indicate growth and spread of the herd. Deer drives are discussed; in a considerable number the deer seen were from 28 to 32 per section, averaging 30. The sex ratio varied with locality from 1:1.5 to 1:5. Overpopulation especially in winter yards has begun and winter feeding has been resorted to, although regarded as biologically unsound. Dressed weights cited are an average of 166 lbs. for 79 bucks, and 315 lbs for the heaviest specimen of the year.

Management: Deer in Michigan

Bartlett, I. H. White-tails--presenting Michigan's deer problem, Michigan Conservation (Dept. of Conservation, Lansing, Mich.), 8(2), Oct. 1938, pp. 4-5, 7, 1 photo; 8(3), Nov. 1938, pp. 4, 6, 8, 11; 8(4), Dec. 1938, pp. 6-7, 10, 3 photos; 8(5), Jan. 1939, pp. 8, 11; 8(6), Feb. 1939, pp. 6-7, 2 photos; 8(7), March 1939, pp. 8, 11. Also printed in pamphlet form with numerous illustrations (same source), 64 pp. (5-1/4 x 7-1/2 inches), 17 photos, 1 map, tables, Oct. 1938.

Statement (illustrated by map) of original ecological conditions as related to deer. In the southern part of the Lower Peninsula, agriculture at first favored, but later suppressed, deer. In a few areas, herds propagated from reintroduced animals do much damage on farms. In districts less suitable for agriculture, logging of heavy timber stands brought about food and cover conditions that resulted in an increase in deer; then repeated burning decreased the deer carrying capacity of cut-over lands; and in comparatively recent times effective fire control has swung the balance again in favor of the deer. At one time market hunting and use of deer for food at logging camps threatened extermination, and from 1881 on increasing restrictions on the killing of deer were enacted into law. The control thus achieved together with the environmental improvement mentioned have been followed by increase in the herds that has been very apparent since 1925. Now the tendency of food plants to grow out of reach of the deer and destruction of much browse by overconsumption, especially in winter yards, seem to indicate that the deer herds are likely to undergo another decline.

A test of management is presented, but fortunately much of the investigation basic to management has been accomplished. It includes survey and classification of deer yards (70-80 percent complete), studies of the sex ratio, counts by deer drives, calculation of the kill based on hunters' reports, experimental study of food consumption, studies of trapping and tagging, and diseases and parasites. Inventory shows that in the Upper Peninsula deer average 18 per square mile, that the total number is about 300,000, of which 1 in 5 are bucks. Hunters kill about a third of the bucks, a number considerably less than the annual increase of both sexes. Winter crowding is severe, food supplies are failing, and there is much fawn mortality. In what is considered deer country in the Lower Peninsula, the animals average 50 to the square mile, about 10 percent of which are bucks. Protection on club lands and on refuges has increased winter losses from starvation and winter feeding has not proved a feasible method of reducing them. The number of hunters has rapidly increased but in the last 7 years their success ratio has dropped from 37 to 24 percent; the annual kill varied from 8,000 in 1931 to 26,000 in 1937. The findings as to the two Peninsulas are summarized in a State table. Management requires control of both the habitat and the herd, and must be correlated with desirable forestry practices in every area. In winter yards, white cedar should be cut on a 25-year rotation to establish and maintain a good supply of browse. Summer food is now in great excess. The numbers of deer should be controlled by regulated hunting, differing from area to area as may be needed.

Management: Electric fence in

McAtee, W. L. The electric fence in wildlife management, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 3(1), Jan. 1939, pp. 1-13, 2 pls.

Electric fencing promises to solve outstanding difficulties of the wildlife manager, but the device needs perfecting and constantly cautious and intelligent use. Types of fences, means of electrifying them, and methods and difficulties of installation are described. Experiences reported to date in controlling animals are quoted with reference to antelope, bear, buffalo, cat, coyote, deer, elk, fishes, livestock, rabbits, and raccoon. The article con-

tains suggestions, objections, and cautions relative to the use of electric fences, and concise directions as to what to do in case of severe electrical shock. Bibliography of 15 titles.

Management: Elk

Parsell, Jack. The elk problem in the Selway, University of Idaho (Moscow) Bul. 33(22), Dec. 1938, pp. 23-25.

From small numbers in 1900, elk have increased until parts of the range are overpopulated. The present kill by hunters does not offset the annual increase and it leaves some of the herds untouched. Management needs are: "First, to regulate the size of the game herds to the carrying capacity of the winter ranges; and second, to obtain in some manner a proper distribution of hunters to make balanced use of the game resource." A companion paper, "The use of controlled hunting in the Selway in 1937," by Jess Robertson and A. B. Hatch (pp. 29-30) reports on a special hunt intended to reduce the numbers of elk on a remote overpopulated area; the results were "disappointing."

Management: Farm game

Dambach, Charles A., and Ernest E. Good. Profits for the farmer, Soil Conservation (Supt. of Documents, Washington, D. C., 10 cents a copy), 4(9), March 1939, pp. 227-228.

Wildlife on farms is desired by sportsmen and nature lovers but "The farmer's interest in maintaining this resource, which only he is in a position to control, depends, however, upon his conviction that wildlife management is a profitable practice on his land." Farmers may get returns from trapping and selling furs or from collecting and marketing food animals, as rabbits; examples are given. Problems of the farmer in relation to hunter trespass are discussed and some of the methods (Williamston Township, Mich.; Wood and Butler counties, Ohio) of solving them are reviewed. "Control of hunting, however, is only part of wildlife management, though it is becoming increasingly necessary, especially near large urban population centers. A direct cash return from the sale of furs and of hunting or fishing rights is important as an incentive to the farmer to make positive provision for the welfare of his wildlife. The greatest value of sound wildlife management on the farm, however, is biologic, for the natural flora and fauna profoundly affect every farmer in his economic and social relationships with the land."

Management: Farm game

Davis, Kenneth S. Game fits in--to a system of soil-saving, money-making farming; and affords a Minnesota neighborhood real enjoyment in the bargain, Successful Farming (1714-24 Locust St., Des Moines, Iowa, 5 cents a copy), 36(10), Oct. 1938, pp. 9, 40-43, 2 maps.

A popular account of soil conservation practices in relation to wildlife and good farming. A land-use pattern cutting across farm boundaries leaves areas where game fits in. Notes on strip-cropping, woodland management, and food patches.

Management: Farmer-sportsman relationship

Baker, John H. No wonder the farmer's frantic, Bird-Lore (1006 Fifth Ave., New York, N. Y., 30 cents a copy), 41(2), March-April 1939, pp. 96, 97-98, 1 cartoon.

The serious problem that hunting trespass presents to farmers is illustrated by examples. An underlying aggravation of the difficulty is the policy of State game departments of selling ever more licenses. "If hunting and fishing as sports are to prevail, basic policies will have to be, not, as is too often the case today, opposition to the posting of land and seeking maximum current income from the sale of licenses, but earnest desire to protect the rights of farmers and other landowners, and solicitude to assure observance of the laws and regulations and considerate, sportsmanlike conduct." As a step toward restriction of the number of licenses, the author suggests examinations for applicants. It would help also if trespass regulations were incorporated into game laws and enforced by game wardens. "We believe that landowners deserve protection of their rights by the state, and that, by and large, they aren't getting that service. It seems to us that, given the leadership of the Conservation and Fish and Game Departments, the hunting and fishing fraternities have it well within their power to quit committing gradual suicide. Will they do it? We think so, when it sinks in that it is they, not the farmers, who need to change their tune. The handwriting is on the wall, as clear as clear can be. The 'Sell more licenses' policy spells the end of hunting and fishing as legal sports."

Management: Farmer-sportsman relationship

Burroughs, R. D. When farmers and hunters cooperate, Michigan Conservation (Dept. of Conservation, Lansing, Mich.), 8(1), Sept. 1938, pp. 4-5, 2 photos, 2 tables; 8(2), Oct. 1938, p. 11, 1 table.

There are about half a million pheasant hunters and 12 million acres of pheasant range--one hunter to every 27 acres of pheasant territory in 1936. The law providing penalties for hunting without permission is quoted and trespass troubles are discussed. The Williamston plan is described as well as its spread, which in 1936 included 33 projects in 13 counties. Cooperation of the State Conservation Department in extending the system; in 1937 there were 34 cooperative exchanges in 16 counties. Working of these projects is summarized. A higher proportion of sportsmen than of farmers were satisfied; the farmers still need assistance in curbing trespass. Difficulties are discussed and suggestions for improvements made. Plans have been revised and each farmer participant receives a printed set of instructions. The merits of the cooperative plan are summarized.

Management: Farmer-sportsman relationship

Conklin, W. Gard. The Pennsylvania cooperative farm-game program, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, 10 cents a copy), 10(1), April 1939, pp. 4-7, 30-31, 2 photos, 2 maps, 1 table.

A review of the plan and its progress in 3 years. Experience has revealed no insurmountable difficulties and it is expected that with cooperation of both farmers and sportsmen, it will thrive and spread. Projects may be established in 27 counties and in 1938 there were 58 in all, involving more than 73,000 acres. Pheasants and rabbits were generally present in satisfactory numbers but a scarcity of quail was reported on all project areas. A medium crop of game is disappointing to sportsmen while a large crop attracting excessive hunting would be objectionable to farmers. What the latter principally get out of the arrangement and what they most appreciate is protection against willful or careless destruction by hunters. Sixty-five deputies were employed and this was one of the most costly features of the program. This patrolling cannot be indefinitely extended by the State, and should be supplemented by volunteer action on the part of sportsmen. Not a single hunting accident was reported--a fine record compared to that of other areas. Farmers are encouraged to preserve cover, and paid for making food patches, leaving strips of grain unharvested, and for rearing pheasants to 6 weeks from chicks supplied by the Game Commission. The Commission also does considerable direct stocking. Estimates indicate that 41,534 hunter-days were spent on the 58 projects and that the following game was taken: Rabbits, 48,350; pheasants, 15,776; quail, 859; squirrels 7,857; grouse, 152; and deer, 40. Expenditures of the Commission are analyzed and explained; they amount to about 32.8 cents per project acre per year.

Management: Farmer-sportsman relationship

Hill, R. C. The Williamston plan of controlled hunting, Michigan Farmer (1632 Lafayette Blvd., Detroit, Mich.), Oct. 22, 1938, pp. 3, 12, 4 photos.

Most of the small game is on farms but farmers are considerably annoyed by those who come to hunt it. The Michigan law provides punishment for trespass but farmers either dislike to employ the law or find it difficult to establish the identity of hunters. The Williamston Plan, devised to solve the problems of both gunners and farmers, worked well and has been applied to 750,000 acres in 17 counties. The plan is described but it must be familiar through frequent mention to readers of WILDLIFE REVIEW, so is not further noticed.

Management: Farmer-sportsman relationship

Wenzel, Herman C. Farmer-sportsman cooperation, Minnesota Conservationist (Dept. of Conservation, St. Paul, Minn., 15 cents a copy), 63, Dec. 1938, pp. 6-7, 26, 10 photos.

"Farmers can produce more game than all the state's game farms combined if they can be convinced that such game is a tangible asset to them." The Commissioner of Conservation (whose photograph accompanies the article) believes that farmers should receive some revenue from wildlife production and cites some examples of payment for shooting privileges. Land unsuitable for crops can be used for wildlife propagation to the benefit of both sportsmen and farmers.

Management: Feed patches

Leopold, Aldo, Ellwood B. Moore, and Lyle K. Sowls. Wildlife food patches in southern Wisconsin, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 3(1), Jan. 1939, pp. 60-69, 2 tables.

Authors' abstract: "Ninety food patches of 30 grains were offered during four years, and their consumption by wildlife deduced from tracks, flushing, observation from blinds, and stomach analyses. The authors conclude that desirable summer and fall foods must be palatable and easily lodged; winter foods must be stiff-stemmed and unpalatable enough to escape earlier exhaustion; spring foods must be unpalatable and easily lodged so as to remain protected by winter snow. The 30 grains are classified according to these criteria, and according to their value to quail, pheasants, and winter songbirds. Their phenology is recorded in tabular form. A key is given for the design of composite patches which combine the properties needed at various seasons. Some grains show a different palatability when offered on the stalk than when exposed as shelled grain in hoppers. Consistency or inconsistency with hopper tests is pointed out." Bibliography of 9 titles.

Management: Field borders

Davison, Verne E. Putting eroded field borders to good use, Soil Conservation (Supt. of Documents, Washington, D. C., 10 cents a copy), 4(9), March 1939, pp. 224-225, 2 figs.

The Soil Conservation Service has been developing methods of vegetating field borders and "It is hoped that crops and woodlands at last can be made to live together as good neighbors, with benefit to farm wildlife, in those parts of the country where farms once were carved out of the primeval forest." In the Southeast, particularly, trees tend to encroach upon the fields and their roots draw food and moisture from the field border so that commonly there is a marginal zone on which it is impossible to produce profitable cultivated crops. Frequently enough is spent on fertilizer and seed to pay for establishing cover that would effectively protect the soil and provide almost ideal wildlife habitat. Details are given of the damage and of its treatment, including planting shrubs in the edge of the woodland and Lespedeza sericea and other herbs on the field border. To discourage encroachment by weeds, the field border may be disked.

Management: Forest management and wildlife management

Edminster, Frank C. Improving farm woodland for wildlife, Soil Conservation (Supt. of Documents, Washington, D. C., 10 cents a copy), 4(9), pp. 212-214, 223.

Wildlife is a woodland crop that may be profitably maintained by the farmer. Suggestions are made for management beneficial in relation to trees, wildlife, and erosion control. To preserve edge effects, no point within a woodland should be more than 300 feet from a margin. Variety in vegetation should be sought and succession allowed for. Cover should be provided by plant-

ing or other methods, and food production encouraged by liberation of useful species, selective cutting, or planting. Devoting field borders to shrubbery promotes the edge effect and increases food and cover, besides benefiting both crops and woods. Specific recommendations are given for a hypothetical case in the Northeast where the ruffed grouse, gray squirrel, cottontail, and small birds are to be encouraged.

Management: Forest wildlife

Ackers, C. P. Practical British forestry (Oxford University Press, Amen House, London, E.C. 4, England, $4.00 a copy), xviii+387 pp., 14 pls., 14 figs., tables, 1938.

Part (pp. 139-157) of chapter 4 describes damage by vertebrates; black game and capercailzie eating terminal buds and transplanted seedlings of conifers; roosting starlings bending over the tops of young trees and fouling the soil with their droppings; squirrels consuming seed and girdling trees near the top; deer nipping off the leading shoots of young trees; mice and voles eating bark; hares devouring tips of transplants; and rabbits damaging both softwoods and hardwoods. In each case, control measures are suggested.

In chapter 5 on Nursery Work, attention is given to the destruction of seeds and seedlings by larks, tits, mice, and moles; together with control methods.

Chapter 9 discusses Sport and Modern Forestry. Despite the shading out effect of maturing plantations, "The private landowner can, by judiciously mixing high forest conifer stands with high forest broad-leaved trees and efficiently run coppice areas, still ensure a maximum yield of high class sport from his estate." Gamekeepers usually hostile to forestry, workmen and farmers apt to poach; all must be coordinated under competent estate managers. Suggestions for management to favor game in woodlands in thicket, pole, and mature forest stages. Remarks also on marginal coverts, coppice, small forests, and strip plantations. How to bring birds to the guns in high forest woodlands. Covert plantings receive special attention and a list is given of recommended plants according to height classes. Under shady pure stands where live cover plants cannot be successfully grown, artificial dead cover can be substituted; directions are given. Use of willows in improving wet grounds, and formation of partridge driving bolts also are discussed. The author concludes that "a combination of well-chosen covert plants, artificial dead cover, and well-placed stops will make shooting in high forest every bit as easy to arrange as in the old-fashioned standards with coppice."

Management: Forest wildlife

Anon. Virginia's wildlife future, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 27(5), Sept.-Oct. 1938, pp. 86-87, 94, 1 drawing, 1 map.

Recent legislation by the Virginia General Assembly authorizes cooperation of the State Commission of Game and Inland Fisheries with the U. S. Forest Service in improving the fish and game resources of the State. The present con-

dition of the forest lands is described and plans and cooperative arrangements are outlined in some detail. "The three immediate objectives are: (1) Restocking the area with wildlife and fish; (2) protection; (3) improvement of the environment. These will be accomplished and supplemented in the long run by seven major efforts: To effect, insofar as possible, a natural balance of all wild birds and animals; to maintain sufficient breeding stock of all species so that there will be provided the maximum surplus of game animals, fur bearers, birds and fish for annual harvest by sportsmen and trappers on a sustained basis; to increase and stabilize the carrying capacity by improving the environment; to maintain animal populations not to exceed the maximum natural carrying capacity of any one species; to effect and maintain wildlife populations in harmony with all other forest users; to protect and preserve the aesthetic value of wild animals and birds of both the game and non-game species; and last, to control the number of undesirable species where and when it is necessary to effect a good ecological and biological balance."

Management: Forest wildlife

Melis, Percy E. The relationship of the Forest Service to game management in Idaho, University of Idaho (Moscow) Bul. 33(22), Dec. 1938, pp. 4-9.

After discussion of the functions of Federal and State governments and their administrative agencies under the American system, the author makes this statement about his organization, in particular: "The Forest Service is a land-managing agency and as a land manager is vitally interested in all of the resources and in all of the forms of life--flora and fauna--that are present on national forest lands. The soil and water, the timber and forage, the fur and game, the fish and fowl, and even the scenery and solitude are resources of the national forests. Good forest administration requires correlated consideration of each and all of these items in management activities." There is some overlapping of functions with respect to wildlife but cooperative effort has thus far prevented any serious conflict in Idaho. Suggestions have been made that authority be centralized but the author recommends continuance of the existing system. "The Forest Service is definitely committed to a policy of cooperation with the state authorities and has no plan or desire to supersede any state authority in game management. The Forest Service insists, however, that wildlife in the forests be managed in accordance with the natural laws governing its existence and that other resources be protected."

Management: Forest wildlife

Varner, I. M. Special game problems in the national forests of southern Idaho, University of Idaho (Moscow) Bul. 33(22), Dec. 1938, pp. 9-11.

The great difficulty is shortage of winter range. Feeding animals on that range aggravates overbrowsing, is too expensive to continue indefinitely, and is otherwise undesirable. Maintenance of refuges characteristically results in overpopulations. The animals usually do not move out of the refuges prior to the hunting season, hence the kill is small, averaging about 10 percent; in exceptional years, it may reach 50 percent. Game cannot be properly managed under such conditions. Other problems are more briefly mentioned. "One of the most

needed things at the present time is a state game law under which it would be possible to take prompt action in managing all game wherever the need arises. Most certainly we wish to produce more game, but before we do so we must provide for its maintenance, and in the meantime we must properly provide for and manage what we now have."

Management: Fur animals

Anon. Fur bearers best managed as one group, Michigan Conservation (Dept. of Conservation, Lansing, Mich.), 8(2), Oct. 1938, p. 10, 2 photos.

Because their furs are prime at about the same time and because all are taken by about the same methods. Trapping on land controlled by individuals is likely to be best managed. It should have regulative aspects as building up populations when prices are low or reducing them when the animals threaten to do harm. Placing any fur animal on the unprotected list is poor practice as it jeopardizes the protected species. When all are protected and damage occurs, relief can be afforded by permit to trap out of season.

Management: General

Leopold, Aldo. Game policy--model 1930, Bird-Lore (1006 Fifth Ave., New York, N. Y., 30 cents a copy), 41(2), March-April 1939, pp. 94-95, 97.

Review of the American Game Association statement of policy of 1930 and comparison of the situation then and now with respect to the following "basic actions": (1) Extend public ownership and management of game-lands; (2) recognize the landowner as the custodian of public game on all other (i.e., non-public) land; (3) experiment with ways to bring land, farmer, and sportsman together; (4, 5) train men. Find facts; (6) recognize the protectionist and the scientist as sharing the responsibility for wild life; (7) provide funds. The greatest single gain since 1930, the author thinks, "lies in the growth of detail in the idea that resources are interdependent." He illustrates this by discussion of the relations of game and predators. Overpopulations of browsing animals prove the need of predators. Moderate losses whether due to hunting or predation have no effect upon average populations. "In predation, however, there is some kind of automatic adjustment that tends to keep losses moderate. I wish we could claim the same for gunpowder." Self-regulation of some populations is mentioned.

Management: General, Ohio

Chapman, Floyd B. Recommendations concerning wildlife management in southeastern Ohio, Ohio Wildlife Research Station (Ohio State University, Columbus) Release No. 98, 16 pp., mimeographed, Oct. 1938.

Condensed from an 800-page research report based on 4 years of research, this paper lists accomplishments in management of wildlife on Ohio public lands 1935-38 and gives numerous administrative recommendations. Wildlife management suggestions relate to controlled hunting; refuges, sanctuaries, and safety zones; food, cover, and water development; and to various animals, including gray squirrel, deer, bear, raccoon, skunk, fox, woodchuck, rabbit, ruffed grouse, and other upland game birds, shore birds, and waterfowl. Bibliography of 16 titles.

Management: Harvesting

Hicks, Lawrence E. A survey of hunting by permit holders of controlled hunting associations, Wood County, Ohio, 1937, Ohio Wildlife Research Station (Ohio State University, Columbus) Release 90, 14 pp., 4 figs., 12 tables, mimeographed, Aug. 1938.

"The controlled hunting system is essentially a democratic and non-profit one. It provides good hunting for more sportsmen--not less. x x x [it] provides an orderly harvest system without abuses, safeguards the seed stock, and creates ideal sportsmen-landowner relationships. It includes active participation of the landowner in both the production and harvest of the crop." The leaflet reports on the participation and experience in the harvest of 3 classes of hunters, rural and non-rural residents, and visitors. The statistics relate to man-hours of hunting, to bags of pheasants, Hungarian partridges and rabbits, percentage of hunting done and of game killed on various days of the season, participation by the various groups, crippling losses, and illegal kill (hens). The material is presented in tables and graphs, and in 20 summary paragraphs. Bibliography of 16 titles.

Management: Harvesting farm game

Leedy, Daniel L. A survey of hunting by farmer-landowners in Wood County, Ohio, in 1937, Ohio Wildlife Research Station (Ohio State University, Columbus) Release 80, 15 pp., 3 figs., 5 tables, 4 maps, mimeographed, Feb. 1938.

About half of the male farm residents are hunters, the proportion being highest where game was most abundant. Statistics are given of the kill of pheasants, Hungarian partridges, and rabbits, and there is some information on crippling losses in the first group. The number of birds taken decreased almost regularly during succeeding days of the open season. Results and hunting pressure are analyzed, graphed, and mapped. Hunting pressure is severe and the question is asked whether it accounts, at least in part, for the lack of increase in the number of pheasants.

Management: Harvesting pheasants

Burroughs, R. D. An analysis of hunting records for the Prairie Farm, Saginaw County, Michigan, 1937, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 3(1), Jan. 1939, pp. 19-25, 2 pls., 1 map, 3 tables.

Author's abstract: "The Prairie Farm (8,401 acres) is so isolated by rivers and canals that it is possible to register all hunters, and to determine their success. The survey involved 2,181 man-days of hunting. The average number of hunters per day was 128, which is equivalent to 9 hunters per sq. mile of range. The total kill of male pheasants was 616, which is equivalent to 47 per sq. mile, or for each 13.6 acres. Sight records indicated a sex-ratio of 1 male to 2 female pheasants. Comparison of the kill per gun-hour on the first three and the last three days of the hunting season indicated that less than half of the cocks inhabiting the area were killed. These data were used for estimating

the total pheasant population on the Prairie Farm at the opening of the hunting season, which was calculated to have been 3,696 birds; or 1 pheasant for each 2.2 acres. Subsequent observations did not disclose any evidence of overshooting.

Management: Harvesting pheasants

Leedy, Daniel L. A study of the 1937 hunting season in Wood County, Ohio, Ohio Wildlife Research Station (Ohio State University, Columbus) Release 91, 8 pp., 2 figs., 3 tables, mimeographed, Sept. 1938.

"More than 10,000 hunters participate in the yearly game harvest of Wood County--an area of 612 square miles. x x x Pheasants continue to increase [however] in spite of the heavy hunting pressure (17 hunters per square mile). Development of the Ohio Pheasant Refuge System, controlled hunting, excellent law enforcement, and ideal [environmental] conditions are, in a large measure responsible for this increase." Hunting pressure in 2 townships is analyzed, tabulated, and graphed; it is by far the most severe during the first 2-3 days of the season. Comparisons are made also of the amount of hunting on lands managed, and those not controlled by game associations. "The attitude of farmers towards pheasants and hunters is more favorable in townships with game protective associations than in non-organized townships." There are some general observations and a bibliography of 6 titles.

Management: Herd regulation

Edwards, O. T. Report on the 1938 winter deer range survey and deer census, Malheur National Forest, Oregon (U. S. Forest Service, John Day, Oreg.), 31 pp., 5 pls., 5 maps, 4 tables, June 1938; text mimeographed, illustrations multilithed.

Preliminary report on a cooperative (Forest Service-Biological Survey) investigation of an overpopulation problem. The objectives of the survey and the methods and personnel employed are stated. Counts of deer and estimates of the population and carrying capacity are given for all parts of the Malheur Forest and adjacent areas. The better types of range harbored one yearling to every two adults but the average for the whole area was 1:3. Seasonal movements are described and browse plants and food preferences commented on and tabulated. The most important species are bitterbrush, mountain mahogany, snowbrush, and juniper. The condition of the winter range is described for a number of representative areas. The limiting factor is winter range mostly in private ownership. Contrary to popular opinion sheep compete less than cattle with game. Proper management of grazing is desirable but the deer population also must be managed. Insect and rodent damage to browse plants is mentioned, the former being more important. The effect of predators on the deer herd was of no material consequence. Deer drift out of refuges to some extent but also move into them during the hunting season. The tendency for the refuge-protected population is to increase to and beyond a safe carrying capacity. "The proper function of a deer refuge is not to act as a permanent and inviolate sanctuary, but is rather to permit a rapid increase in the deer herd until it can support legal hunting. Whenever that objective has been reached, the refuge should be discontinued. When handled in this manner the refuge becomes a valuable tool in game management seeking a stabilized maximum yield."

Two refuges on the Forest are described; both are overstocked. Management problems and suggestions are presented in synoptic form, the publication is summarized, and the following conclusions drawn: "(1) A serious problem of overpopulation exists on the most important units of the winter range; (2) the browse on these areas is severely damaged and the present productivity and carrying capacity is greatly reduced; (3) an immediate reduction in the deer herd is essential to prevent further range damage and a heavy winter loss of deer in the near future; (4) domestic grazing does not materially reduce the game carrying capacity when the range is properly managed; (5) elimination of all livestock from the national forest land would not solve the present deer problem nor would it materially benefit the deer herds; (6) elimination of all big game from private land and the national forests would not materially benefit the livestock industry nor would it eliminate the necessity for proper range practices; (7) the future game producing capacity of the land on and adjoining the Malheur National Forest is dependent upon efficient game management of the area; (8) it is very desirable that a system be devised whereby the land owner possessing winter deer range will in effect trade part of the use of this land to the public for game production in return for the use of public lands for livestock production."

Management: Herd regulation

Olson, A. L. The 'firing line' in the management of the northern elk herd, University of Idaho (Moscow) Bul. 33(22), Dec. 1938, pp. 36-42.

History of increase of the Yellowstone elk and of efforts to provide sufficient winter range. "Any plan which fails to provide for the systematic removal of the increase of a herd of animals on any range which is fully stocked must necessarily fail." Account of hunts arranged by cooperation with State officials. Change in personnel interrupted efforts to reduce the herd until the new officials could be educated as to the need--an argument for more stable tenure of office in game departments.

Management: Inventory, fur animals

Wade, Douglas. Economic survey and general inventory of native Pennsylvania fur-bearers, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, 10 cents a copy), 10(1), April 1939, p. 10, 1 photo.

Report of progress of an investigation begun in Snyder County but to be extended later. Results from interviewing more than 1,000 families as to their trapping activities and income. The trappers are mostly youths, sell largely to local buyers, chiefly depend upon the receipts for incidental income. The animals most commonly trapped are skunks, muskrats, opossums, and weasels.

Management: Inventory, Wisconsin lakes

Bordner, John S., et al. Inventory of northern Wisconsin lakes, State Planning Board (Madison, Wis.), Bul. 5, 64 pp. (7-3/4 x 10-3/4 inches), illus., many tables, Jan. 1939.

Discussion of aquatic plants includes references to their value as food for ducks and other wildlife. The common food plants of beavers, muskrats, and wild ducks are listed and those of the last-named group tabulated to show the parts of the plant utilized, the favorite habitat of the plants, and their value in providing food and cover. There is a short discussion of predators, including turtles, birds, and "brush wolves." Lakes favorable for ducks are listed and the leading features of many lakes, including their aquatic vegetation are briefly characterized in tabulations extending over pp. 26-64, inclusive.

Management: Land utilization program

Peterson, Walter A. Wildlife in the land utilization program, Soil Conservation (Supt. of Documents, Washington, D. C., 10 cents a copy), 4(9), March 1939, p. 229.

"The land utilization program of the Department of Agriculture has been concerned primarily with effecting needed adjustments in the pattern of land ownership and land use in distressed submarginal agricultural areas. Four major types of development have been planned and initiated on land utilization project areas: (1) grazing, (2), forestry, (3) wildlife conservation, and (4) recreational facilities." The rather checkered career of the project through 5 organizations is summarized in a footnote; it is now in the Soil Conservation Service. Examples of the work are given as purchase of 32 refuges totaling 722,000 acres for the Biological Survey, reclamation of marsh lands for States, development of quail lands and propagating plants in the Southeast, and of hatcheries for the Bureau of Fisheries; small lakes and ponds have been created for fish production and wild fowl utilization; streams have been improved; and sanctuaries established in cooperation with State governments. A table summarizes accomplishments according to types of development for a 3-year period ending with 1938, inclusive.

Management: Leasing shooting rights

Towns, Homer G. Cash in the rancher's pocket, Soil Conservation (Supt. of Documents, Washington, D. C., 10 cents a copy), 4(9), March 1939, pp. 226, 232.

"Though without rights of ownership, in the game itself, the landowner who protects wildlife, and controls ingress to the land occupied by it, is now conceded to have the right to charge the hunter for the privilege of shooting over his holdings." Several examples are given of returns from leases in Texas in 1938, the highest at the rate of 33 cents per acre. Control of grazing and strict regulation of hunting are necessary to the success of these projects. In general game is increasing on the leased lands, decreasing elsewhere. Criticism of commercialization is heard but, "The sportsman who cannot pay the price does not even get the 'free' game; and each season the price reaches a new high because the game population drops to a new low. Actually free hunting passed with free land. It is now a delusion for which we pay a terrific toll in wildlife of all sorts. x x x If we can set in operation a system that will make it worth while for the landowner to practice wildlife management we can without question reverse the present downward trend in farm and ranch game."

Management: Logging in relation to wildlife

Chapel, Wm. L. Wildlife vs. logging, Arizona Wildlife and Sportsman (125 North 2nd Ave., Phoenix, Ariz., 15 cents a copy), 1(1), Jan. 1939, p. 9, 1 photo (on cover of magazine).

Observations on logging operations south of Williams, Arizona, in relation to wildlife. Nothing is said as to whether the loggers were killing wildlife in or out of season--the greatest hazard in connection with cutting operations in some regions. The author, however, thinks that wildlife was little disturbed. His conclusions are: "In any discussion of game there are three essentials to be considered, namely; food, water, and cover. Naturally, logging affects these, as does any force which disturbs the forest. Under modern conservative logging methods the food supply is increased, the water supply is not affected, and cover is increased tremendously. Whenever game is in an area, some factor decides the maximum number, and is thus the limiting factor. If water was the limiting factor before logging, the total number of game animals would be unchanged, but if either food or cover was the limiting factor and these are increased by logging, the restriction is raised and the number may increase until stopped by a new limiting factor or the old one raised to a new point. In a wildlife program certain things are done in the forest to aid game in one way or another. It is interesting to note that many of these, such as opening the forest stand to increase the areas of food supply, building brush shelters, building fire lanes, are all done in logging. When the work is done by lumberjacks, the results will be the same as tho the work was done intentionally and for game purposes, and under conservative logging the forest is not opened enough to make deer much more visible while hunted."

Management: Marsh and aquatic plants

McAtee, W. L. Wildfowl food plants. Their value, propagation and management, Collegiate Press, Inc. (Ames, Iowa, $1.50 a copy), ix+141 pp., 17 pls., 4 figs., tables, Jan. 1939.

This book discusses briefly the productivity, food value, and utilization by wild fowl of aquatic plants. The longest chapter treats important food plants by families, giving notes on their variety, recognition, ecology, and use by waterfowl. Chapters are devoted to environmental limitations on the growth of aquatic plants, as illumination, fertility, quality of water, and pollution; to planting suggestions including storing and handling, together with recommendations of plants for particular environments; to construction of ponds for various sites and preparation of planting areas; and to control of undesirable plants and animals. There is also a glossary of vernacular names of wild fowl food plants, a bibliography of 37 titles, and a 15-page index.

Management: Miscellaneous

Anon. North Carolina wildlife conservation (Division of Game and Inland Fisheries, Raleigh, N. C.), 2(11), Nov. 1938, 15 pp., 4 photos; 2(12), Dec. 1938, 15 pp., 4 photos; 3(2), Feb. 1939, 15 pp., 4 photos; 3(3), March 1939, 15 pp., 4 figs.

November. In an article on Conservation Education, it is emphasized that the public must be enlightened if wildlife is to be preserved. Hunting exploits seem to have more news value than management procedures, but the hazards of extinction and the means of conserving wildlife must be brought home to the people. Sporting magazines concentrate on game species and other agencies dwell on specific topics to the neglect of general conservation. The only remedy is to teach it in the schools of all grades. The economic, esthetic, and recreational values of wildlife have a natural interest to youth which should be appealed to in an effort to make them good conservationists.

December. The great response of gray squirrels to provision of nest boxes (kegs, and sections of hollow logs) and food on a North Carolina farm is noted. Birds nested successfully in the same area, only one nest of 9 found being destroyed. House cats were deadly enemies of the young squirrels. The surplus population of squirrels migrated to nearby woodlands.

February. An article on game as a crop emphasizes that good distribution of food and cover is just as important as adequate quantity. As a rule it is not difficult to provide desirable interspersion on North Carolina farms, but "clean farming" apparently on the increase is a menace that must be met. In a brief sketch relating to ditch banks, it is pointed out that these are often important as wildlife highways, and it is urged that cleaning them be restricted to one side at a time, or to blocks with areas between them left undisturbed.

March. Notes on destruction of wildlife by automobiles with plea for more care by drivers. Suggestions as to the placing, preparation, and planting of food patches with list of 18 recommended plants and dates and rates per acre of sowing. In a discussion of estimating quail populations, the counting of whistling cocks is said to be useful only in spring and of no real value in forming estimates. Trapping is impracticable, and the most feasible method for the average landowner seems to be counting of coveys and roughly estimating the number in each during February and March. There are notes on possible densities of quail population and on safe harvest proportions. In an article on the wood duck by J. W. Kestler, are quoted observations on these birds eating acorns dropped into water by squirrels, and of a mother wood duck carrying her young singly from the nest to water on her back.

Management: Miscellaneous

Ruhl, H. D. Game Division. Ninth Biennial Rep. Dept. of Conservation, State of Michigan (Lansing) 1937-1938, pp. 191-254, 1 pl., 1 map, 21 tables.

About 22 pages of this report are devoted to deer; they cover in part the same material as Bartlett's paper (abstracted elsewhere, pp. 20-21, in this issue of WILDLIFE REVIEW) but also supplement it. Phases of the subject treated are history of the Michigan deer herd and its food supply, summary of present conditions, crop damage by deer, experiments with electric fence, feeding experiments, food and cover plantings, release cuttings, yarding conditions, and pathology. Progress in re-establishment of the moose and elk is reported. Under the head of small game is discussed the bad effects of drainage, especi-

ally on muskrats; decline in the cottontail population (best remedy--reduction in amount of hunting); the ruffed grouse cycle now on the upgrade (more hunting can be permitted), and management and other studies of this bird; planting of sharp-tailed grouse; status of the Hungarian partridge; the closed season on squirrels; and wildlife investigations on the W. K. Kellogg Sanctuary and other areas. A report on cooperative study of the food habits of predators gives definite information on 5 species: coyote, wolf, red fox, mink, and otter. The fur crop continues to rank with several of the more important agricultural commodities and three-fourths of it is produced on the better agricultural lands. Information is given on public shooting grounds, wildlife sanctuaries, State game farm, roadside zoos, cooperative farm-game program, and extension activities, and there is a summary of the status of the principal fur and game species of the State.

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